

**REMARKS**

The Office Action mailed August 12, 2009 has been carefully considered. Within the Office Action Claims 1-12, 17, 18, 20 and 21 have been rejected; and Claims 13-16, 19, and 22 have been objected to. The Applicants have amended Claims 1, 3, 7-10, 12, 13 and 15-18. In addition, the Applicants have added new Claims 23-27. No new matter has been entered. Reconsideration in view of the following remarks is respectfully requested.

**Claim Objections**

Claim 22 is objected to under 37 CFR 1.75(c) as being allegedly in improper form because it is a multiple dependent claim. Applicants have amended Claim 22, and with this amendment it is respectfully submitted the claim satisfies the statutory requirements.

**Rejection under U.S.C. § 102**

Claims 1-12 stand rejected under 35 U.S.C. § 102(e) as being allegedly anticipated by U.S. Patent No. 7,315,666 to Van Der Spek. The Applicants respectfully traverse.

According to the M.P.E.P., a claim is anticipated under 35 U.S.C. § 102(a), (b) and (e) only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.

Applicants' specification discloses an instrumented tubular device for transporting a pressurized fluid notably in the field of oil exploration and in that of the transport of gas or hydrocarbons. This device comprises a tube in which this fluid flows, with which are associated means for measuring the main deformations of this tube, and means for measuring the temperature of the fluid in the tube. This tube is equipped with measurement means integral with its surface and offset by at least one remote optical cable towards an electronic measurement

system. These measurement means are means for assembling at least two non-parallel optical fibers which comprise at least three assemblies of at least two optical gages with Bragg gratings attached to at least three measurement locations and connected to the remote optical cable ~~(23)~~ via optical fibers. At least one assembly further comprises a temperature gage. (Specification, Abstract).

Van Der Spek discloses a system for measuring pressure, temperature, elongation, torsion and bending at any point along the length of an elongate carrier tube using one or more coiled optical fibers that are embedded in the wall of the tube such that deformation of the carrier tube induces strain in each optical fiber. A pulsed laser light source transmits a sequence of light pulses of a selected wavelength from an upstream end of each fiber into a coiled substantially uniform light guide channel provided by the optical fiber. A light sensor assembly detects any shift in wavelength of the light pulses which are backscattered from various locations along the length of the light guide channel. A signal processing assembly then calculates a strain pattern along the length of the fiber, and a pressure difference between the interior and exterior of the tube at various locations along the length of the carrier tube. Several fibers are wound at different pitch angles and in different directions and at different diameters in the wall of the carrier tube and the signal processing assembly calculates bending, torsion and both radial and axial deformation of the carrier tube on the basis of a comparison of the strain patterns induced on different optical fibers. (Van Der Spek, Abstract).

In contrast to the claimed subject matter, Van Der Spek does not disclose "at least two non-parallel optical fibers which comprise at least three assemblies of at least two optical gauges with Bragg gratings," as recited in Claim 1. Additionally, Van Der Spek does not disclose that these at least three assemblies are fixed in at least three measurement locations which are distributed along the tube, in which they are connected together and connected to the remote

optical cable via optical fibers, as recited in Claim 1. Further, Van Der Spek does not disclose that at least one assembly further comprises a temperature gauge, as recited in Claim 1.

It is stated on Page 3 of the Office Action that Van Der Spek discloses "using assembly of pluralities of fiber optic, with Bragg grating (see for example claim 19)." The Applicants respectfully disagree. Claim 19 expressly states, "The fiber optical system of claim 12, wherein each of the optical fibers comprises one or more single mode wave guide channels which are **substantially free** of Fibre-Bragg gratings and fluorescent reflecting materials". (Van Der Spek, Claim 19) (emphasis added). Thus, Van Der Spek does not disclose this limitation in Claim 1, and expressly teaches away from the use of Bragg gratings. Van Der Spek further supports that Bragg gratings are not used in his invention in Column 7, Lines 6-9 of his patent. For at least these reasons, Van Der Spek does not disclose the claimed subject matter.

It should be noted for the record that the office action states on Page 3, Lines 2-3 that Van Der Spek discloses "means for measuring the temperature" in Claim 18 of Van Der Spek's application. Applicants respectfully disagree. Claim 18 of Van Der Spek's patent states, the system is a Brillouin back scattering system in which the Brillouin peaks in a backscattered pulsed optical signal are indicative of the strain and the temperature...". For at least these reasons, Van Der Spek does not disclose the claimed subject matter.

Considering that Van Der Spek does not expressly or inherently disclose each and every element/limitation in Claim 1, a *prima facie* case of anticipation has not been established. Accordingly, withdrawal of the rejection is respectfully requested.

Claims 2-12 are dependent on Independent Claim 1. As stated above, Claim 1 is allowable over Van Der Spek. Accordingly, Claims 2-12 are allowable for being dependent on an allowable base claim.

#### Rejection under 35 U.S.C. § 103

Claims 17-18, 20-21 stand rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Van Der Spek. This rejection is respectfully traversed. Claims 17-18, 20-21 are dependent on Independent Claim 1. As stated above, Claim 1 is allowable over Van Der Spek. Accordingly, Claims 17-18, 20-21 are allowable for being dependent on an allowable base claim.

#### New Claims

The Applicants have added new Claims 23-27 to the present application. The Applicants believe that New claims are fully supported by the specification and no new matter has been added.

Claim 23 recites an instrumented tubular device for transporting a pressurized fluid comprising a tube in which this fluid flows, with which are associated means for measuring the main deformations of the tube, and means for measuring the temperature of the fluid in the tube, characterized in that this tube is equipped with measurement means assembled in order to form at least one rosette which forms a two-dimensional flexible sensor, the measurement means integral with a surface and offset by at least one remote optical cable towards an optoelectronic measurement system, in that these measurement means are means for assembling at least two non-parallel optical fibers which comprise at least three assemblies of at least two optical gages with Bragg gratings, said at least three assemblies being fixed in at least three measurement

locations distributed along the tube, connected together and connected to the remote optical cable via optical fibers, and in that at least one assembly further comprises a temperature gage and at least three measurement casings, in which three sensors isolated from the external hydrostatic pressure and connected through tubular connectors are positioned respectively, wherein a central casing is connected to the measurement instrumentation through a remote optical cable. Claim 23 combines Claim 1 with objected to dependent Claim 13. Considering that it is expressly stated in the office action that Claim 13 would be allowable if rewritten in independent form, Applicants respectfully request allowance of New Claim 23.

Claim 24 recites an instrumented tubular device for transporting a pressurized fluid comprising a tube in which this fluid flows, with which are associated means for measuring the main deformations of the tube, and means for measuring the temperature of the fluid in the tube, characterized in that this tube is equipped with measurement means assembled in order to form at least one rosette which forms a two-dimensional flexible sensor, the measurement means integral with a surface and offset by at least one remote optical cable towards an optoelectronic measurement system, in that these measurement means are means for assembling at least two non-parallel optical fibers which comprise at least three assemblies of at least two optical gages with Bragg gratings, said at least three assemblies being fixed in at least three measurement locations distributed along the tube, connected together and connected to the remote optical cable via optical fibers, and in that at least one assembly further comprises a temperature gage and at least three measurement casings, in which three sensors isolated from the external hydrostatic pressure and connected through tubular connectors are positioned respectively, wherein the casings and the connectors are welded to each other so as to form a rigid assembly. Claim 24 combines Claim 1 with objected to dependent Claim 14. Considering that it is expressly stated

in the office action that Claim 14 would be allowable if rewritten in independent form, Applicants respectfully request allowance of New Claim 24.

Claim 25 recites an instrumented tubular device for transporting a pressurized fluid comprising a tube in which this fluid flows, with which are associated means for measuring the main deformations of the tube, and means for measuring the temperature of the fluid in the tube, characterized in that this tube is equipped with measurement means assembled in order to form at least one rosette which forms a two-dimensional flexible sensor, the measurement means integral with a surface and offset by at least one remote optical cable towards an optoelectronic measurement system, in that these measurement means are means for assembling at least two non-parallel optical fibers which comprise at least three assemblies of at least two optical gages with Bragg gratings, said at least three assemblies being fixed in at least three measurement locations distributed along the tube, connected together and connected to the remote optical cable via optical fibers, and in that at least one assembly further comprises a temperature gage and at least three measurement casings, in which three sensors isolated from the external hydrostatic pressure and connected through tubular connectors are positioned respectively, wherein the remote cable includes a stainless steel tube filled with gel and containing several single mode optical fibers, of a weave of steel wires separated by plastic sheaths. Claim 25 combines Claim 1 with objected to dependent Claim 15. Considering that it is expressly stated in the office action that Claim 15 would be allowable if rewritten in independent form, Applicants respectfully request allowance of New Claim 25.

Claim 26 recites an instrumented tubular device for transporting a pressurized fluid comprising a tube in which this fluid flows, with which are associated means for measuring the main deformations of the tube, and means for measuring the temperature of the fluid in the tube, characterized in that this tube is equipped with measurement means assembled in order to form

at least one rosette which forms a two-dimensional flexible sensor, the measurement means integral with a surface and offset by at least one remote optical cable towards an optoelectronic measurement system, in that these measurement means are means for assembling at least two non-parallel optical fibers which comprise at least three assemblies of at least two optical gages with Bragg gratings, said at least three assemblies being fixed in at least three measurement locations distributed along the tube, connected together and connected to the remote optical cable via optical fibers, and in that at least one assembly further comprises a temperature gage and at least three measurement casings, in which three sensors isolated from the external hydrostatic pressure and connected through tubular connectors are positioned respectively, wherein the remote cable includes a stainless steel tube filled with gel and containing several single mode optical fibers, of a weave of steel wires separated by plastic sheaths, wherein the central casing incorporates a base intended for making the connection with the remote optical cable. Claim 26 combines Claim 1 with objected to dependent Claim 16. Considering that it is expressly stated in the office action that Claim 16 would be allowable if rewritten in independent form, Applicants respectfully request allowance of New Claim 26.

Claim 27 recites an instrumented tubular device for transporting a pressurized fluid comprising a tube in which this fluid flows, with which are associated means for measuring the main deformations of the tube, and means for measuring the temperature of the fluid in the tube, characterized in that this tube is equipped with measurement means assembled in order to form at least one rosette which forms a two-dimensional flexible sensor, the measurement means integral with a surface and offset by at least one remote optical cable towards an optoelectronic measurement system, in that these measurement means are means for assembling at least two non-parallel optical fibers which comprise at least three assemblies of at least two optical gages with Bragg gratings, said at least three assemblies being fixed in at least three measurement

locations distributed along the tube, connected together and connected to the remote optical cable via optical fibers, and in that at least one assembly further comprises a temperature gage and at least three measurement casings, in which three sensors isolated from the external hydrostatic pressure and connected through tubular connectors are positioned respectively, the device including at least one assembly of three sensors covered with a protective coating, wherein a distribution box provides the connection between the sensors of each assembly and a main optical cable connected to the measurement instrumentation. Claim 27 combines Claim 1 with objected to dependent Claim 19. Considering that it is expressly stated in the office action that Claim 19 would be allowable if rewritten in independent form, Applicants respectfully request allowance of New Claim 27. Allowance of new Claims 23-27 is respectfully requested.



Conclusion

It is believed that this reply places the above-identified patent application into condition for allowance. Early favorable consideration of this reply is earnestly solicited.

If, in the opinion of the Examiner, an interview would expedite the prosecution of this application, the Examiner is invited to call the undersigned attorney at the number indicated below.

Applicant respectfully requests that a timely Notice of Allowance be issued in this case. Please charge any additional required fee or credit any overpayment not otherwise paid or credited to our deposit account No. 50-3557.

Respectfully submitted,

Dated: November 12, 2009

/Suvashis Bhattacharya/  
Suvashis Bhattacharya  
Reg. No. 46,554

Nixon Peabody LLP  
200 Page Mill Road  
2<sup>nd</sup> Floor  
Palo Alto, CA 94306  
Tel. (650) 320-7700  
Fax (650) 320-7701